

WHAT IS CLAIMED IS:

1                   1. An internal combustion engine with a plurality of cylinders,  
2 the engine including an intake manifold and an exhaust manifold, the engine being  
3 operated such that the intake manifold pressure generally exceeds the exhaust  
4 manifold pressure, the engine further comprising:

5                   a low pressure turbocharger including a turbine driven by the exhaust  
6 gases and a compressor having an inlet receiving fresh intake air and an outlet  
7 providing low pressure charge air;

8                   a high pressure turbocharger including a turbine driven by the exhaust  
9 gases and a compressor having an inlet receiving the low pressure charge air and an  
10 outlet providing high pressure charge air to the intake manifold;

11                  an exhaust gas recirculation (EGR) system passively routing a portion  
12 of the exhaust gases to the high pressure turbocharger compressor inlet.

1                   2. The internal combustion engine of claim 1 further comprising:  
2                   a charge air cooler between the low pressure turbocharger compressor  
3 outlet and the high pressure turbocharger compressor inlet.

1                   3. The internal combustion engine of claim 1 further comprising:  
2                   a particulate filter located in the EGR system to filter particulate  
3 matter from the exhaust gases prior to introduction to the high pressure turbocharger  
4 compressor inlet.

1                   4. The internal combustion engine of claim 1 further comprising:  
2                   an EGR cooler located in the EGR system to cool the exhaust gases  
3 prior to introduction to the high pressure turbocharger compressor inlet.

1                   5. The internal combustion engine of claim 1 further comprising:  
2                   a particulate filter located in the EGR system to filter particulate  
3 matter from the exhaust gases prior to introduction to the high pressure turbocharger  
4 compressor inlet; and

5 an EGR cooler located in the EGR system downstream of the  
6 particulate filter to cool the exhaust gases prior to introduction to the high pressure  
7 turbocharger compressor inlet.

4 a particulate filter located in the EGR system to filter particulate  
5 matter from the exhaust gases prior to introduction to the high pressure turbocharger  
6 compressor inlet; and

7 an EGR cooler located in the EGR system downstream of the  
8 particulate filter to cool the exhaust gases prior to introduction to the high pressure  
9 turbocharger compressor inlet, wherein the exhaust gases are introduced at a  
10 location downstream of the charge air cooler.

1                   7.       The internal combustion engine of claim 1 wherein a  
2 compression ratio of the low pressure turbocharger is greater than a compression  
3 ratio of the high pressure turbocharger.

1                   8.        The internal combustion engine of claim 7 wherein the  
2 compression ratio of the low pressure turbocharger is greater than 1.5 times the  
3 compression ratio of the high pressure turbocharger.

1                   9.     A method of controlling an internal combustion engine with  
2     a plurality of cylinders, the engine including an intake manifold and an exhaust  
3     manifold, the engine being operated such that the intake manifold pressure generally  
4     exceeds the exhaust manifold pressure, the engine including a low pressure  
5     turbocharger including a turbine driven by the exhaust gases and a compressor  
6     having an inlet receiving fresh intake air and an outlet providing low pressure  
7     charge air, and the engine further including a high pressure turbocharger including  
8     a turbine driven by the exhaust gases and a compressor having an inlet receiving the  
9     low pressure charge air and an outlet providing high pressure charge air to the  
10    intake manifold, the method further comprising:

11                   passively routing a portion of the exhaust gases to the high pressure  
12                   turbocharger compressor inlet to provide exhaust gas recirculation.

1                   10.    The method of claim 9 further comprising:  
2                   cooling the low pressure charge air from the low pressure  
3                   turbocharger compressor outlet prior to the high pressure turbocharger compressor  
4                   inlet.

1                   11.    The method of claim 9 further comprising:  
2                   filtering particulate matter from the exhaust gases prior to  
3                   introduction to the high pressure turbocharger compressor inlet.

1                   12.    The method of claim 9 further comprising:  
2                   cooling the exhaust gases prior to introduction to the high pressure  
3                   turbocharger compressor inlet.

1                   13.    The method of claim 9 further comprising:  
2                   filtering particulate matter from the exhaust gases prior to  
3                   introduction to the high pressure turbocharger compressor inlet; and  
4                   after filtering, cooling the exhaust gases prior to introduction to the  
5                   high pressure turbocharger compressor inlet.

1                   14.    The method of claim 9 further comprising:  
2                   cooling the low pressure charge air from the low pressure  
3                   turbocharger compressor outlet prior to the high pressure turbocharger compressor  
4                   inlet;  
5                   filtering particulate matter from the exhaust gases prior to  
6                   introduction to the high pressure turbocharger compressor inlet; and  
7                   after filtering, cooling the exhaust gases prior to introduction to the  
8                   high pressure turbocharger compressor inlet, wherein the exhaust gases are  
9                   introduced to cooled low pressure charge air.

1                   15. The method of claim 9 wherein a compression ratio of the low  
2 pressure turbocharger is greater than a compression ratio of the high pressure  
3 turbocharger.

1                   16. The method of claim 15 wherein the compression ratio of the  
2 low pressure turbocharger is greater than 1.5 times the compression ratio of the high  
3 pressure turbocharger.